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(71) Applicant: **Samsung Electronics Co., Ltd.**
Suwon-si, Gyeonggi-do, 443-742 (KR)

(72) Inventors:

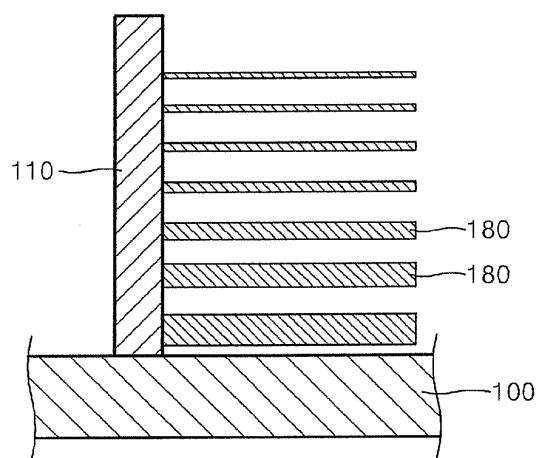
- Park, Young-jun
Gibeung-gu, Yongin-si
Gyeonggi-do (KR)
- Baik, Chan-wook
Gibeung-gu, Yongin-si
Gyeonggi-do (KR)

(74) Representative: **Greene, Simon Kenneth**
Elkington and Fife LLP
Prospect House
8 Pembroke Road
Sevenoaks
Kent TN13 1XR (GB)

(54) Solar cells having nanowires and methods of fabricating nanowires

(57) A solar cell includes a plurality of nanowires arranged such that diameters of the nanowires sequentially increase in a first direction along a path of incident light. In a method of forming nanowires, a catalyst layer is formed on a substrate, a plurality of nanoparticles are formed by thermally processing the catalyst layer, and nanowires are grown from the plurality of nanoparticles. The catalyst layer has a thickness that increases in a first direction, and the plurality of nanoparticles have diameters that increase in the first direction.

FIG. 3





EUROPEAN SEARCH REPORT

Application Number
EP 10 16 5708

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (IPC)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
A	WO 2008/048232 A2 (Q1 NANOSYSTEMS INC [US]; ARGO BRIAN [US]; VIDU RUXANDRA [US]; STROEVE) 24 April 2008 (2008-04-24) * figure 2 *	1-7	INV. H01L31/04 H01L31/0352 C30B29/60
A	MEHTA B R ET AL: "A graded diameter and oriented nanorod-thin film structure for solar cell application: a device proposal", SOLAR ENERGY MATERIALS AND SOLAR CELLS, ELSEVIER SCIENCE PUBLISHERS, AMSTERDAM, NL, vol. 85, no. 1, 7 June 2004 (2004-06-07), pages 107-113, XP027815026, ISSN: 0927-0248 [retrieved on 2005-01-01] * the whole document *	1-7	
A	----- A. KANDALA ET AL: "General theoretical considerations on nanowire solar cell designs", PHYSICA STATUS SOLIDI (A), vol. 206, no. 1, 18 September 2008 (2008-09-18), pages 173-178, XP055115336, ISSN: 1862-6300, DOI: 10.1002/pssa.200723672 * the whole document *	1-7	TECHNICAL FIELDS SEARCHED (IPC)
A	----- US 2007/178709 A1 (KAMINS THEODORE I [US]) 2 August 2007 (2007-08-02) * paragraph [0029]; figures 1, 3a *	8-15	H01L C30B
A	----- WO 2008/135905 A2 (NXP BV [NL]; AGARWAL PRABHAT [BE]) 13 November 2008 (2008-11-13) * page 9, line 9 - line 16; figures 1-3 *	8-15	
The present search report has been drawn up for all claims			
1	Place of search Berlin	Date of completion of the search 25 April 2014	Examiner Le Meur, M
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
EPO FORM 1503.03.82 (P04C01) X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			



Application Number

EP 10 16 5708

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).



LACK OF UNITY OF INVENTION
SHEET B

Application Number
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The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-15

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1.1. claims: 1-7

Solar cell with nanowires with graded diameters laterally impinged by incident light

1.2. claims: 8-15

Method for forming nanowires with a catalyst layer having a thickness that increases in a first direction of the substrate.

Please note that all inventions mentioned under item 1, although not necessarily linked by a common inventive concept, could be searched without effort justifying an additional fee.

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on. The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

25-04-2014

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